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Registered No. 2007 - 32999

NOTARIAL CERTIFICATE

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80-6, SUSONG-DONG, CHONGRO-KU,
SEOUL, KOREA

23230-05311일
90. 11. 26 승인

210mm×297mm
특급 80g/㎡

STATEMENT

I hereby state that the English translation for the cerficate copy of Korean Patent Application No. 2002-44942 enclosed herewith is true and accurate.

Date : December 7, 2009

Signature : Sun-young Kim

Name : Sun-young KIM
Korean Patent Attorney

METHOD OF FORWARDING PACKET CALLS IN MOBILE COMMUNICATION SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a method of forwarding packet calls in a mobile communication system and, in particular, to a method of forwarding all packet calls received at an IP address of a subscriber via Internet to a previously designated URL address registered in HRL, a certain server address or another mobile communication terminal.

2. Description of the Related Art

As illustrated in Figure 1, a next generation General Packet Radio Service (GPRS) network generally includes mobile station (MS) 10, Radio Network Controller (RNC) 20, Home Location Register (HLR) 30, Servicing GPRS Support Node (SGSN) 40, Gateway GPRS Support Node (GGSN) 50 and Internet network 60. The RNC 20 is a wireless network control system. The HLR 30 is a database for managing mobile communication subscribers, and stores all subscriber information and manages location information (circuits/packets) for incoming call routing. The SGSN 40 is a GPRS support system and is operated together with the RNC 20 by Iu interface. The SGSN 40 is operated together with the GGSN 50 by Gn interface and supports GPRS service of the MS 10. The GGSN 50 is operated together with an external packet switch network and is operated together with the SGSN 40 by using IP backbone by Gn

interface. The GGSN 50 supports the packet data service between the MS 1 and the external packet switch network. Here, the Iu interface refers to an interface between the RNC 20 and the core network, and the Gn interface refers to an interface between the SGSN 40 and the GGSN 50 in the same carrier network.

In the GPRS network of the related art, there is a problem in that, when a packet call is requested from the Internet network 60 to an arbitrary mobile communication terminal, forwarding is not carried out to other terminal or address. Here, the call forwarding refers to the forwarding of a call received at the mobile communication terminal of a subscriber, who subscribes to the corresponding call forwarding service, to a previously designated URL address, a certain server address or another mobile communication terminal.

Accordingly, there is a need for a service which enables forwarding of a call to another terminal or address designated by a subscriber, when there is a request of packet call from the Internet network 60 to an arbitrary mobile communication terminal.

SUMMARY OF THE INVENTION

The present invention is to solve the above-described problem and an object of the present invention is to forward all incoming packet calls received at an IP address of an IMT subscriber from the Internet network in the next generation GPRS network to a previously designated URL address registered in HRL, a certain server address or another mobile communication terminal, when the subscriber has registered the forwarding.

In order to achieve the object, in whole or in part, there is provided a method of forwarding packet calls in a mobile communication system comprising: receiving

packet data from an Internet network and transmitting first routing information request message; determining whether a corresponding called subscriber has set up a call forwarding service according to the first routing information request message; transmitting first routing information including forwarding data according to the result of said determining; and setting up packet calls according to the forwarding data.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates the configuration of the next generation GPRS network in the related art.

Figure 2 illustrates the configuration of the next generation GPRS network according to a preferred embodiment of the present invention.

Figure 3 illustrates the method of forwarding packet calls in a mobile communication system according to a preferred embodiment of the present invention.

DETAILED DESCRIPTION OF HE PREFERRED EMBODIMENT

Hereinafter, a detailed explanation will be given as to the preferred embodiment of the present invention with reference to the attached drawings.

Figure 2 illustrates the configuration of the next generation GPRS network according to a preferred embodiment of the present invention. The next generation GPRS network includes MS 10, 11, RNC 20, 21, HLR 30, 31, SGSN 40, 41, GGSN 50, and Internet network 60. The GGSN 50 receives packet data [PDP (Packet Data Protocol) PDU (Packet Data Unit)] from the Internet network 60, extracts the destination IP address from the received packet data, and obtains International Mobile Subscriber Identity (IMSI) from the extracted destination IP address. Then, the GGSN

50 requests the address of SGSN, where the called subscriber location is registered, by transmitting first routing information request message to HLR1 30. The GGSN 50 receives first routing information from the HLR1 30, obtains the IMSI for the forward-to IP address, and requests the address of SGSN, where the called subscriber location is registered, by transmitting second routing information request message to HLR2 30. Then, the GGSN 50 receives the second routing information from the HLR2 31, and transmits packet data receipt notification request message notifying that packet data has been received from the Internet network 60 to SGSN2 41 newly determined for the forward-to IP address. The SGSN2 41 checks the status information about whether the subscriber can answer, and transmits packet data receipt notification response message to the GGSN 50.

When the HLR1 30 receives the first routing information request message from the GGSN 50, the HLR1 30 obtains the IMSI for the corresponding destination IP address, and transmits the first routing information to the GGSN 50. When the HLR2 31 receives the second routing information request message from the GGSN 50, the HLR2 31 checks the IMSI and subscriber status, and transmits the second routing information including the address of SGSN, where the called subscriber location is registered, to the GGSN 50.

When the SGSN2 41 receives the packet data receipt notification request message notifying that packet data has been received from the Internet network 60 from the GGSN 50, the SGSN2 41 checks the status information about whether the called subscriber can answer, and transmits the packet data receipt notification response message to the GGSN 50.

A detailed description of the method of forwarding packet calls in a mobile

communication system according to a preferred embodiment of the present invention will be given with reference to Figure 3.

When the GGSN 50 receives packet data from the Internet network 60, the GGSN 50 extracts the destination IP address, obtains the IMSI by referring to the address and subscriber information registered in the database of the GGSN using the extracted destination IP address, and requests the address of the SGSN, where the called subscriber location is registered, by transmitting the first routing information request message to the HLR1 30. The GGSN 50 can obtain the IMSI because the IMSI is managed in an IP address specific way.

When the HLR1 30 receives the first routing information request message from the GGSN 50, the HLR1 30 checks the IMSI and subscriber status based on the received first routing information request message.

From the subscriber information, the HLR1 30 determines whether a forwarding service is registered. Let's assume that all the subscriber information is stored in HLR 30, 31 and the operator stores the service-related information only when the subscriber subscribes to the forwarding service.

Provided that the forwarding service is set up, the first routing information is transmitted to the GGSN 50, together with forwarding data. The forward-to IP address is included in the forwarding data. The information element related to the first routing information is changed by adding a forwarding information parameter and is transmitted to the GGSN 50.

The GGSN 50 determines whether the first routing information has been received from the HLR1 30, and, in that case, determines whether the forwarding data is included in the received message. If the forwarding data is included in the message

received from the HLR1 30, the GGSN 50 obtains the IMSI for the forward-to IP address, and requests the address of SGSN, where the called subscriber location is registered, by transmitting the second routing information request message to HLR2 31. In case an IP address the IMSI for which cannot be obtained is included in the destination IP address, the GGSN 50 acts as a router by routing the packet call to the Internet network 60. This means that the GGSN has determined that the destination IP belongs not to the mobile communication network but to the Internet network 60, after referring to its database.

After receiving the second routing information request message, the HLR2 31 checks the IMSI and subscriber status based on the second routing information request message, and transmits the second routing information including the new address of SGSN2 41, where the location of the subscriber is registered, to the GGSN 50.

Then, the GGSN 50 transmits the packet data receipt notification request message notifying that packet data has been received from the Internet network 60 to the SGSN2 41 newly determined for the forward-to IP address. The SGSN2 41 checks the status information about whether the subscriber can answer, and transmits the packet data receipt notification response message to the GGSN 50.

Then, the SGSN2 41 performs paging within a certain routing area (RA), and the MS2 11 responses to the paging, thereby performing PDP context activation procedure (setting up of packet calls in the next generation GPRS network). As a result, wireless resources are set up between the MS2 11 and the RNC2 21, and among the RNC2 21, the SGSN2 41 and the GGSN 50, a PDP context is generated and a traffic path is set up. Thus, the subscriber can transmit and receive the packet data.

The foregoing embodiments and advantages are merely exemplary and are not

to be construed as limiting the present invention. The present teaching can be readily applied to other types of methods. The description of the present invention is intended to be illustrative, and not to limit the scope of the claims. Many alternatives, modifications and variations will be apparent to those skilled in the art.

According to the present invention, a mobile communication subscriber can forward all the packet calls received at the IP address of the subscriber via Internet to a previously designated URL address registered in HRL, a certain server address or another mobile communication terminal, thereby automatically routing the packet calls to a commercial or advertising home page.

WHAT IS CLAIMED IS:

1. A method of forwarding packet calls in a mobile communication system comprising:

receiving packet data from an Internet network and transmitting first routing information request message;

determining whether a corresponding called subscriber has set up a call forwarding service according to the first routing information request message;

transmitting first routing information including forwarding data according to the result of said determining; and

setting up packet calls according to the forwarding data.

2. The method of claim 1, wherein said receiving packet data from an Internet network and transmitting first routing information request message further comprises:

extracting the destination IP address from the received packet data, and obtaining International Mobile Subscriber Identity (IMSI) by retrieving addresses and subscriber identity information registered in the database of Servicing GPRS Support Node (GGSN); and

requesting the location of the subscriber by transmitting first routing information request message including the IMSI to Home Location Register HLR1.

3. The method of claim 1, wherein said setting up packet calls according to the forwarding data further comprises:

transmitting second routing information request message according to the forwarding data;

notifying the receipt of packet data according to the second routing information request message;

determining whether the called subscriber can answer based on the received packet data; and

setting up packet calls according to the result of said determining.

4. The method of claim 1, wherein the forwarding data includes the forward-to IP address and is transmitted as included in the first routing information.

5. The method of claim 1 or 4, wherein the forwarding data is added to information element of the first routing information to change the information element.

6. The method of claim 1, wherein the forwarding data includes a previously designated URL address registered in HRL, a certain server address or an address of another mobile communication subscriber.

7. The method of claim 3, wherein said determining whether the called subscriber can answer further comprises the procedure wherein:

HLR2, which has received the second routing information request message from the GGSN, checks the IMSI and subscriber status and transmits second routing information to the GGSN;

the GGSN transmits packet data receipt notification request message notifying that packet data has been received from the Internet network to Servicing GPRS Support Node SGSN2 newly determined for the forward-to IP address; and

the SGSN2 checks the status information about whether the subscriber can answer, and transmits packet data receipt notification response message to the GGSN.

8. The method of claim 3 or 7, which further comprises the procedure wherein:

when the subscriber can answer, the SGSN2 performs paging within a certain routing area (RA), and mobile station MS2 responses to the paging; and

a PDP context is generated among Radio Network Controller RNC2, SGSN2 which has been newly determined and the GGSN.

ABSTRACT OF THE DISCLOSURE

The present invention relates to a method of forwarding packet calls in a mobile communication system and, in particular, to a method of forwarding all packet calls received at an IP address of a subscriber via Internet to a previously designated URL address registered in HRL, a certain server address or another mobile communication terminal.

A method of forwarding packet calls in a mobile communication system according to the present invention includes: receiving packet data from an Internet network and transmitting first routing information request message; determining whether a corresponding called subscriber has set up a call forwarding service according to the first routing information request message; transmitting first routing information including forwarding data according to the result of said determining; and setting up packet calls according to the forwarding data.

Fig. 1

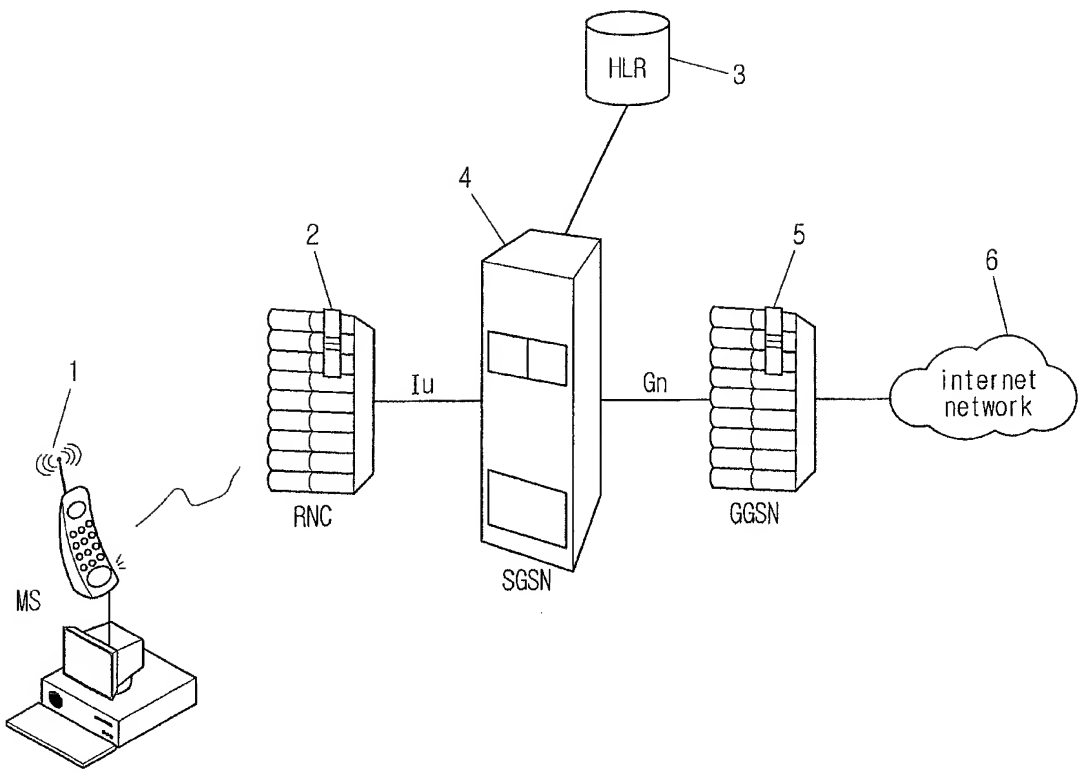
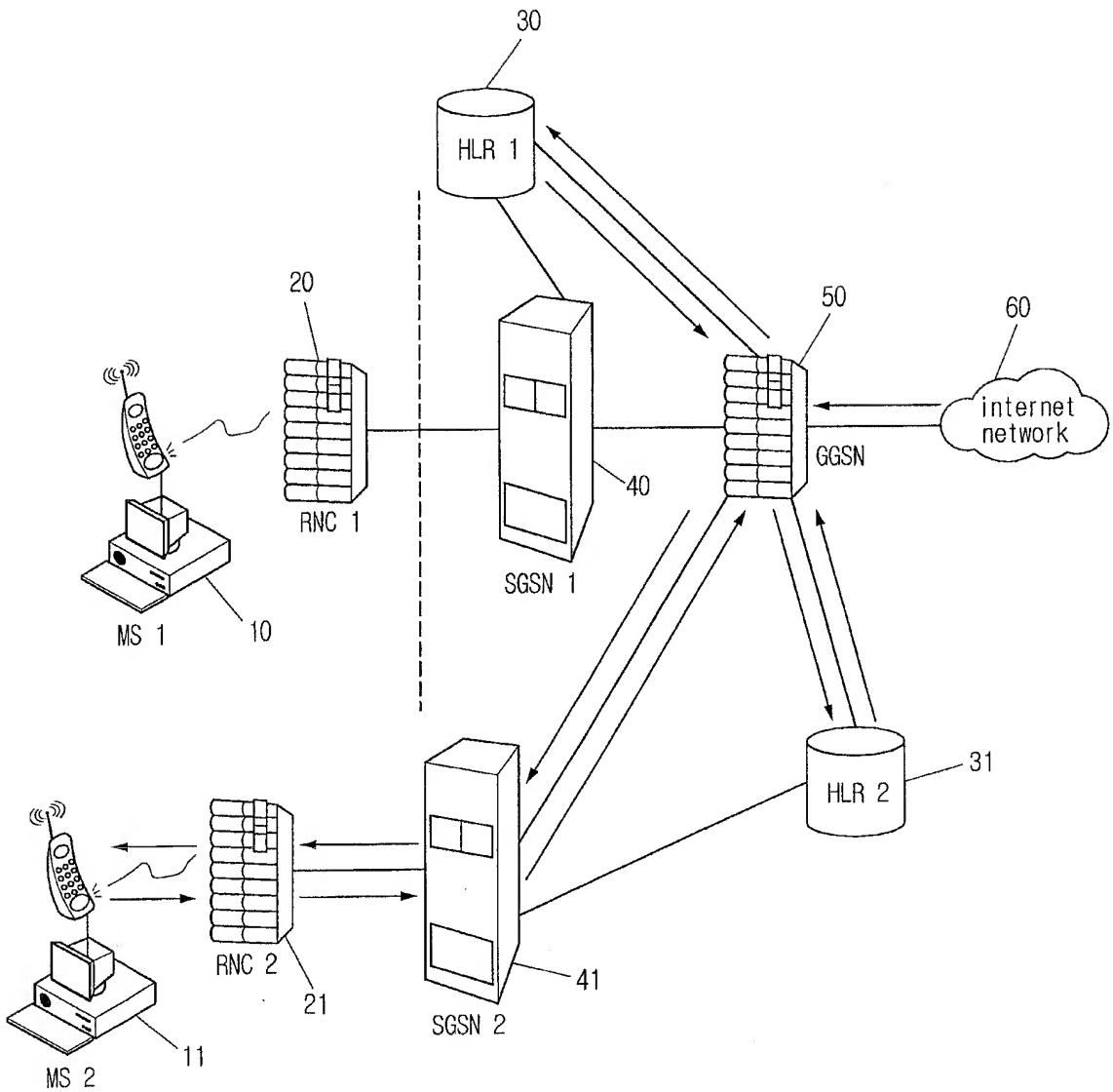


Fig. 2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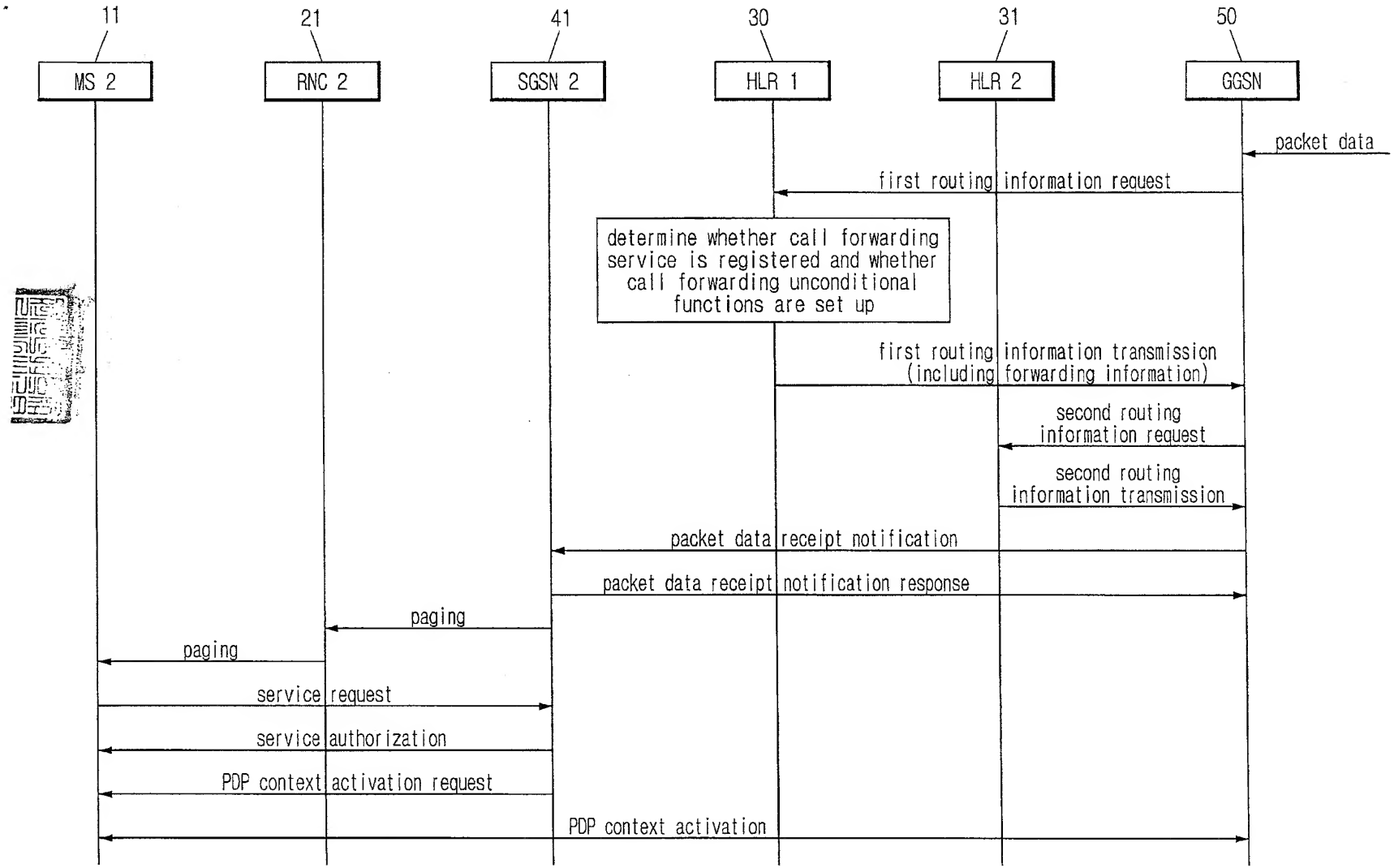
HLR 1
20
50
60
internet
network
GGSN
RNC 1
40
SGSN 1
MS 1
10
31
HLR 2
RNC 2
21
41
SGSN 2
11
MS 2

Fig. 3


11
21
41
30
31
50
MS 2
RNC 2
SGSN 2
HLR 1
HLR 2
GGSN
packet data
first routing information request
determine whether call forwarding service is registered and whether call forwarding unconditional functions are set up
first routing information transmission (including forwarding information)
second routing information request
second routing information transmission
packet data receipt notification
packet data receipt notification response
paging
paging
service request
service authorization
PDP context activation request
PDP context activation

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등부 2007 년 제 32999 호 Registered No. 2007 - 32999

인 증

NOTARIAL CERTIFICATE

위 진 술 서

Sun-young Kim

에 기재된 김 순 영 은
본직의 면전에서 위 사서증서에
자기가 서명날인 한 것임을 자인
하였다.

personally appeared before
me and admitted his (her)
subscription to the attached
STATEMENT.

2007 년 12 월 7 일
이 사무소에서 위 인증한다.

This is hereby attested on this 7th day
of DEC. 2007. at this office.

공증인가 법무법인 케이씨엘
서울특별시 종로구 수송동 80-6

KIM, CHOI & LIM
80-6, SuSong-dong, ChongRo-Gu.
Seoul, Korea

공증담당변호사

Attorney at Law acting as Notary Public

Hee Taek Lim

This office has been authorized by the Minister of Justice, the Republic of Korea to act as Notary Public since, July 18, 1991 under Law No. 3790.

23230 - 05411 일
90. 11. 26 승인

210㎜×297㎜
특급80g/㎡

METHOD OF FORWARDING PACKET CALLS IN MOBILE COMMUNICATION SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a method of forwarding packet calls in a mobile communication system and, in particular, to a method of forwarding all packet calls received at an IP address of a subscriber via Internet to a previously designated URL address registered in HRL, a certain server address or another mobile communication terminal.

2. Description of the Related Art

As illustrated in Figure 1, a next generation General Packet Radio Service (GPRS) network generally includes mobile station (MS) 10, Radio Network Controller (RNC) 20, Home Location Register (HLR) 30, Servicing GPRS Support Node (SGSN) 40, Gateway GPRS Support Node (GGSN) 50 and Internet network 60. The RNC 20 is a wireless network control system. The HLR 30 is a database for managing mobile communication subscribers, and stores all subscriber information and manages location information (circuits/packets) for incoming call routing. The SGSN 40 is a GPRS support system and is operated together with the RNC 20 by Iu interface. The SGSN 40 is operated together with the GGSN 50 by Gn interface and supports GPRS service of the MS 10. The GGSN 50 is operated together with an external packet switch network and is operated together with the SGSN 40 by using IP backbone by Gn

interface. The GGSN 50 supports the packet data service between the MS 1 and the external packet switch network. Here, the Iu interface refers to an interface between the RNC 20 and the core network, and the Gn interface refers to an interface between the SGSN 40 and the GGSN 50 in the same carrier network.

In the GPRS network of the related art, there is a problem in that, when a packet call is requested from the Internet network 60 to an arbitrary mobile communication terminal, forwarding is not carried out to other terminal or address. Here, the call forwarding refers to the forwarding of a call received at the mobile communication terminal of a subscriber, who subscribes to the corresponding call forwarding service, to a previously designated URL address, a certain server address or another mobile communication terminal.

Accordingly, there is a need for a service which enables forwarding of a call to another terminal or address designated by a subscriber, when there is a request of packet call from the Internet network 60 to an arbitrary mobile communication terminal.

SUMMARY OF THE INVENTION

The present invention is to solve the above-described problem and an object of the present invention is to forward all incoming packet calls received at an IP address of an IMT subscriber from the Internet network in the next generation GPRS network to a previously designated URL address registered in HRL, a certain server address or another mobile communication terminal, when the subscriber has registered the forwarding.

In order to achieve the object, in whole or in part, there is provided a method of forwarding packet calls in a mobile communication system comprising: receiving

packet data from an Internet network and transmitting first routing information request message; determining whether a corresponding called subscriber has set up a call forwarding service according to the first routing information request message; transmitting first routing information including forwarding data according to the result of said determining; and setting up packet calls according to the forwarding data.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates the configuration of the next generation GPRS network in the related art.

Figure 2 illustrates the configuration of the next generation GPRS network according to a preferred embodiment of the present invention.

Figure 3 illustrates the method of forwarding packet calls in a mobile communication system according to a preferred embodiment of the present invention.

DETAILED DESCRIPTION OF HE PREFERRED EMBODIMENT

Hereinafter, a detailed explanation will be given as to the preferred embodiment of the present invention with reference to the attached drawings.

Figure 2 illustrates the configuration of the next generation GPRS network according to a preferred embodiment of the present invention. The next generation GPRS network includes MS 10, 11, RNC 20, 21, HLR 30, 31, SGSN 40, 41, GGSN 50, and Internet network 60. The GGSN 50 receives packet data [PDP (Packet Data Protocol) PDU (Packet Data Unit)] from the Internet network 60, extracts the destination IP address from the received packet data, and obtains International Mobile Subscriber Identity (IMSI) from the extracted destination IP address. Then, the GGSN

50 requests the address of SGSN, where the called subscriber location is registered, by transmitting first routing information request message to HLR1 30. The GGSN 50 receives first routing information from the HLR1 30, obtains the IMSI for the forward-to IP address, and requests the address of SGSN, where the called subscriber location is registered, by transmitting second routing information request message to HLR2 30. Then, the GGSN 50 receives the second routing information from the HLR2 31, and transmits packet data receipt notification request message notifying that packet data has been received from the Internet network 60 to SGSN2 41 newly determined for the forward-to IP address. The SGSN2 41 checks the status information about whether the subscriber can answer, and transmits packet data receipt notification response message to the GGSN 50.

When the HLR1 30 receives the first routing information request message from the GGSN 50, the HLR1 30 obtains the IMSI for the corresponding destination IP address, and transmits the first routing information to the GGSN 50. When the HLR2 31 receives the second routing information request message from the GGSN 50, the HLR2 31 checks the IMSI and subscriber status, and transmits the second routing information including the address of SGSN, where the called subscriber location is registered, to the GGSN 50.

When the SGSN2 41 receives the packet data receipt notification request message notifying that packet data has been received from the Internet network 60 from the GGSN 50, the SGSN2 41 checks the status information about whether the called subscriber can answer, and transmits the packet data receipt notification response message to the GGSN 50.

A detailed description of the method of forwarding packet calls in a mobile

communication system according to a preferred embodiment of the present invention will be given with reference to Figure 3.

When the GGSN 50 receives packet data from the Internet network 60, the GGSN 50 extracts the destination IP address, obtains the IMSI by referring to the address and subscriber information registered in the database of the GGSN using the extracted destination IP address, and requests the address of the SGSN, where the called subscriber location is registered, by transmitting the first routing information request message to the HLR1 30. The GGSN 50 can obtain the IMSI because the IMSI is managed in an IP address specific way.

When the HLR1 30 receives the first routing information request message from the GGSN 50, the HLR1 30 checks the IMSI and subscriber status based on the received first routing information request message.

From the subscriber information, the HLR1 30 determines whether a forwarding service is registered. Let's assume that all the subscriber information is stored in HLR 30, 31 and the operator stores the service-related information only when the subscriber subscribes to the forwarding service.

Provided that the forwarding service is set up, the first routing information is transmitted to the GGSN 50, together with forwarding data. The forward-to IP address is included in the forwarding data. The information element related to the first routing information is changed by adding a forwarding information parameter and is transmitted to the GGSN 50.

The GGSN 50 determines whether the first routing information has been received from the HLR1 30, and, in that case, determines whether the forwarding data is included in the received message. If the forwarding data is included in the message

received from the HLR1 30, the GGSN 50 obtains the IMSI for the forward-to IP address, and requests the address of SGSN, where the called subscriber location is registered, by transmitting the second routing information request message to HLR2 31. In case an IP address the IMSI for which cannot be obtained is included in the destination IP address, the GGSN 50 acts as a router by routing the packet call to the Internet network 60. This means that the GGSN has determined that the destination IP belongs not to the mobile communication network but to the Internet network 60, after referring to its database.

After receiving the second routing information request message, the HLR2 31 checks the IMSI and subscriber status based on the second routing information request message, and transmits the second routing information including the new address of SGSN2 41, where the location of the subscriber is registered, to the GGSN 50.

Then, the GGSN 50 transmits the packet data receipt notification request message notifying that packet data has been received from the Internet network 60 to the SGSN2 41 newly determined for the forward-to IP address. The SGSN2 41 checks the status information about whether the subscriber can answer, and transmits the packet data receipt notification response message to the GGSN 50.

Then, the SGSN2 41 performs paging within a certain routing area (RA), and the MS2 11 responses to the paging, thereby performing PDP context activation procedure (setting up of packet calls in the next generation GPRS network). As a result, wireless resources are set up between the MS2 11 and the RNC2 21, and among the RNC2 21, the SGSN2 41 and the GGSN 50, a PDP context is generated and a traffic path is set up. Thus, the subscriber can transmit and receive the packet data.

The foregoing embodiments and advantages are merely exemplary and are not

to be construed as limiting the present invention. The present teaching can be readily applied to other types of methods. The description of the present invention is intended to be illustrative, and not to limit the scope of the claims. Many alternatives, modifications and variations will be apparent to those skilled in the art.

According to the present invention, a mobile communication subscriber can forward all the packet calls received at the IP address of the subscriber via Internet to a previously designated URL address registered in HRL, a certain server address or another mobile communication terminal, thereby automatically routing the packet calls to a commercial or advertising home page.

WHAT IS CLAIMED IS:

1. A method of forwarding packet calls in a mobile communication system comprising:

receiving packet data from an Internet network and transmitting first routing information request message;

determining whether a corresponding called subscriber has set up a call forwarding service according to the first routing information request message;

transmitting first routing information including forwarding data according to the result of said determining; and

setting up packet calls according to the forwarding data.

2. The method of claim 1, wherein said receiving packet data from an Internet network and transmitting first routing information request message further comprises:

extracting the destination IP address from the received packet data, and obtaining International Mobile Subscriber Identity (IMSI) by retrieving addresses and subscriber identity information registered in the database of Servicing GPRS Support Node (GGSN); and

requesting the location of the subscriber by transmitting first routing information request message including the IMSI to Home Location Register HLR1.

3. The method of claim 1, wherein said setting up packet calls according to the forwarding data further comprises:

transmitting second routing information request message according to the forwarding data;

notifying the receipt of packet data according to the second routing information request message;

determining whether the called subscriber can answer based on the received packet data; and

setting up packet calls according to the result of said determining.

4. The method of claim 1, wherein the forwarding data includes the forward-to IP address and is transmitted as included in the first routing information.

5. The method of claim 1 or 4, wherein the forwarding data is added to information element of the first routing information to change the information element.

6. The method of claim 1, wherein the forwarding data includes a previously designated URL address registered in HRL, a certain server address or an address of another mobile communication subscriber.

7. The method of claim 3, wherein said determining whether the called subscriber can answer further comprises the procedure wherein:

HLR2, which has received the second routing information request message from the GGSN, checks the IMSI and subscriber status and transmits second routing information to the GGSN;

the GGSN transmits packet data receipt notification request message notifying that packet data has been received from the Internet network to Servicing GPRS Support Node SGSN2 newly determined for the forward-to IP address; and

the SGSN2 checks the status information about whether the subscriber can answer, and transmits packet data receipt notification response message to the GGSN.

8. The method of claim 3 or 7, which further comprises the procedure wherein:

when the subscriber can answer, the SGSN2 performs paging within a certain routing area (RA), and mobile station MS2 responses to the paging; and

a PDP context is generated among Radio Network Controller RNC2, SGSN2 which has been newly determined and the GGSN.

ABSTRACT OF THE DISCLOSURE

The present invention relates to a method of forwarding packet calls in a mobile communication system and, in particular, to a method of forwarding all packet calls received at an IP address of a subscriber via Internet to a previously designated URL address registered in HRL, a certain server address or another mobile communication terminal.

A method of forwarding packet calls in a mobile communication system according to the present invention includes: receiving packet data from an Internet network and transmitting first routing information request message; determining whether a corresponding called subscriber has set up a call forwarding service according to the first routing information request message; transmitting first routing information including forwarding data according to the result of said determining; and setting up packet calls according to the forwarding data.

Fig. 1

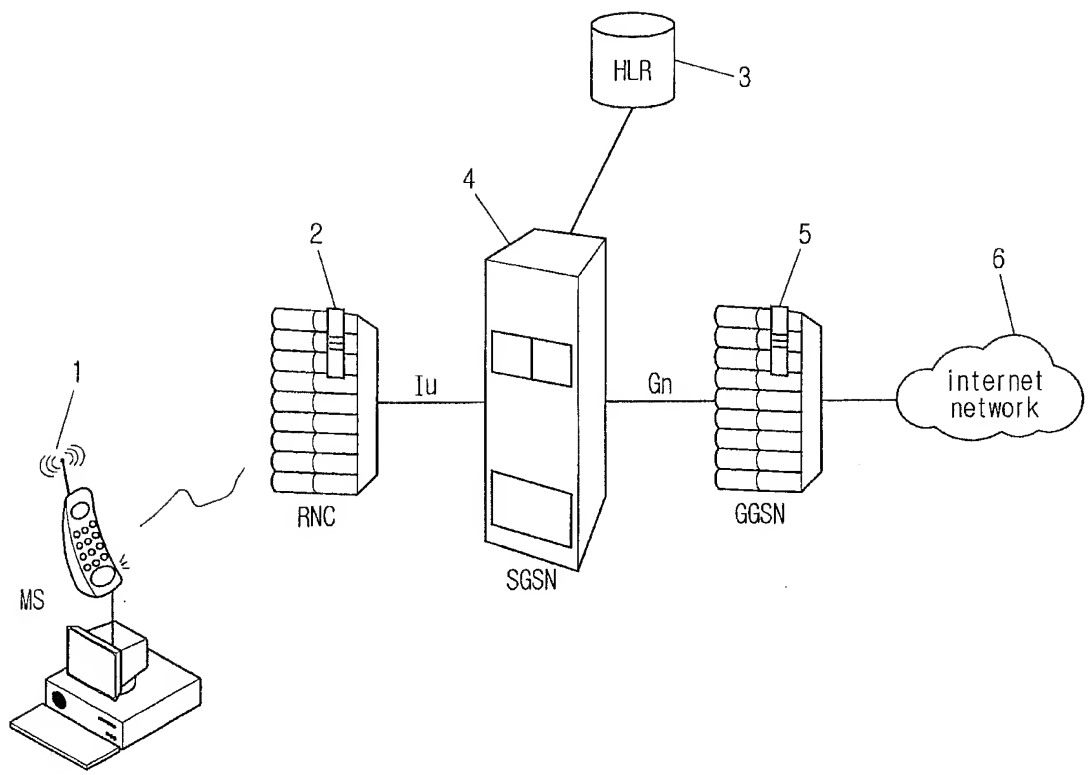
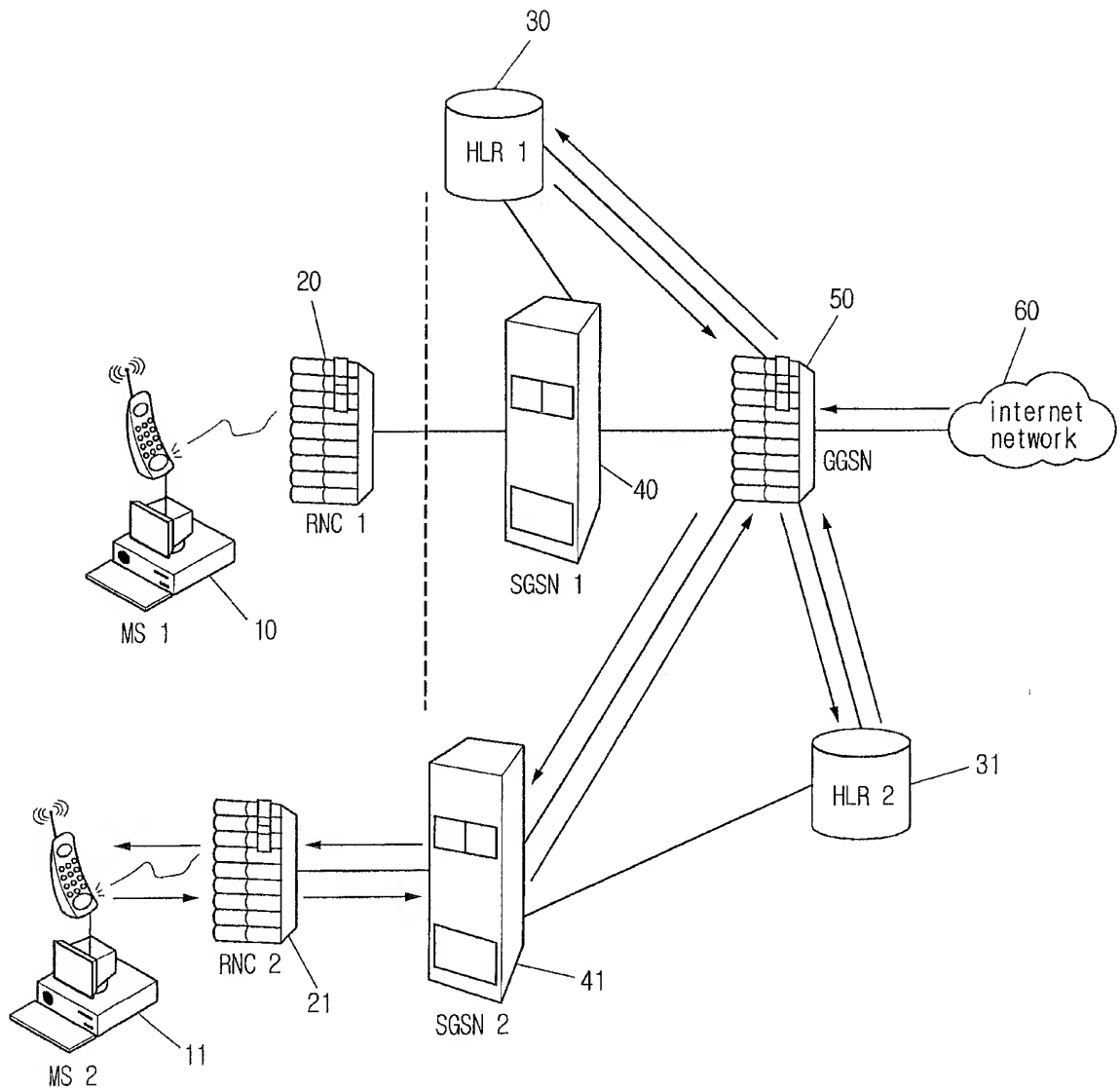


Fig. 2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HLR 1
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internet
network
GGSN
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SGSN 1
MS 1
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RNC 2
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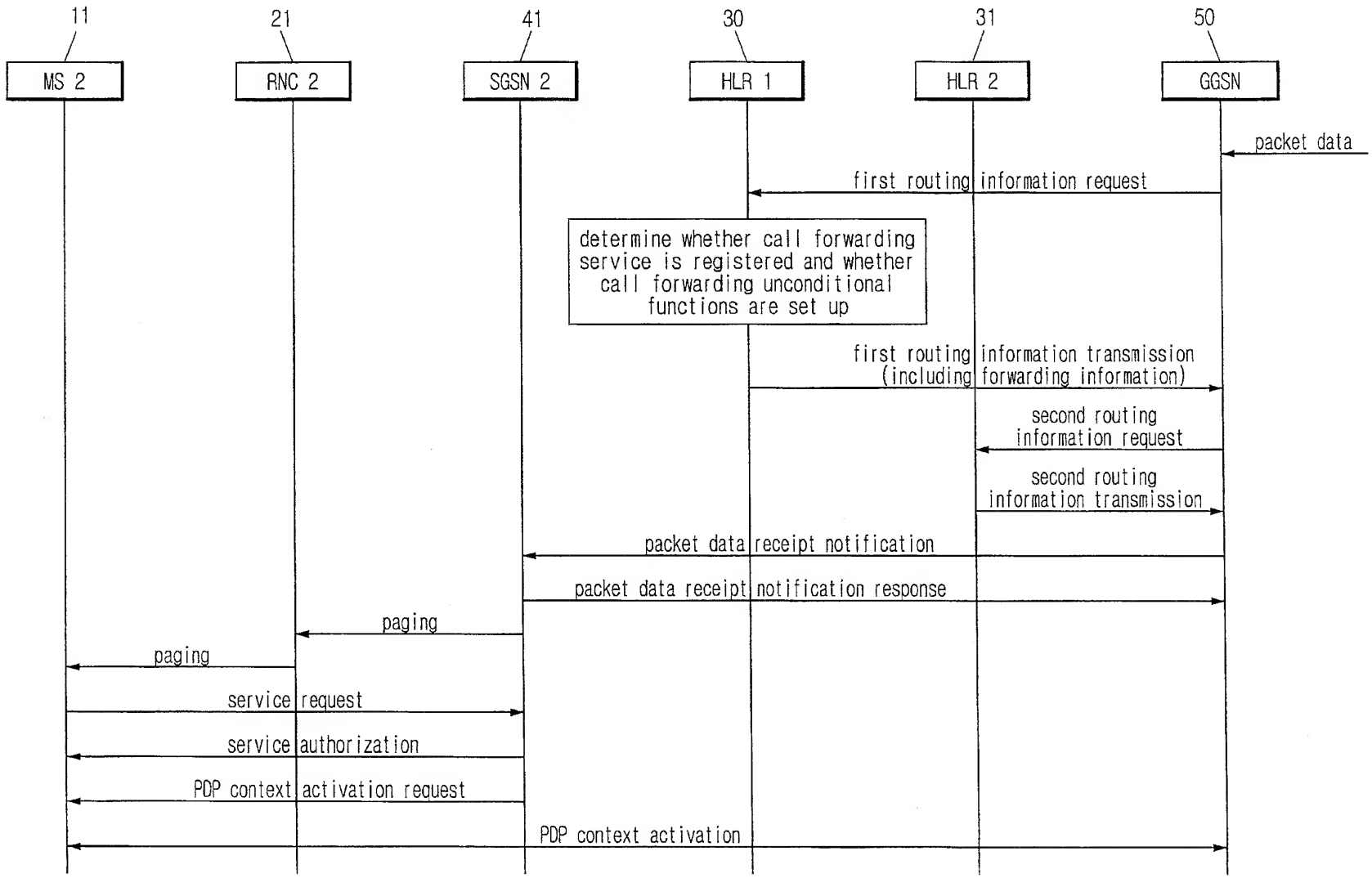
SGSN 2
11
MS 2

Fig. 3


11
21
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31
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RNC 2
SGSN 2
HLR 1
HLR 2
GGSN
packet data
first routing information request
determine whether call forwarding service is registered and whether call forwarding unconditional functions are set up
first routing information transmission (including forwarding information)
second routing information request
second routing information transmission
packet data receipt notification
packet data receipt notification response
paging
paging
service request
service authorization
PDP context activation request
PDP context activation